

# A DOKTORI ÉRTEKEZÉS TÉZISEI ANGOL NYELVEN

AZ ÉRTEKEZÉS CÍME: A MIKROSZERKEZET ÉS AZ ÉLETTARTAM-KIMERÜLÉS KAPCSOLATA  
ÖTVÖZETLEN ILLETVE GYENGÉN ÖTVÖZÖTT ACÉLOKBAN

KÉSZÍTETTE: GÉMES GYÖRGY ANDRÁS

## 1. Thesis

I have found that the profiles of the X-ray diffraction patterns of the investigated low alloy creep resistant steel are extremely narrow. This indicates that this structural material is of large grain character and that the third order microstrains in the material are rather small.

## 2. Thesis

I have realized that the two dimensional images of the 310 back-reflection Bragg-reflections provide good possibilities to measure the second order, grain-to-grain internal stresses. I have found that in the initial state of the material the second order, grain-to-grain internal stresses do not exceed the measure of experimental accuracy. This is in correlation with the strain and stress relieving annealing treatments, during which most of the dislocations annihilate out of the materials.

## 3. Thesis

I have found that during a period of about 2/3 of the life-span exhaustion of the investigated steel the second order, grain-to-grain internal stresses reach significantly high values. The same second order, grain-to-grain internal stresses strongly decrease in the last section of the life-span exhaustion period of the material. I explained the observed behaviour of the second order, grain-to-grain internal stresses on the basis of the deterioration of grain boundaries.

## 4. Thesis

I have stated that the dislocation density values are rather small during the entire service period, where this applies also to the initial state of the investigated steel. I have also found that the values of the dislocation densities decrease only slightly during the whole service period.

## 5. Thesis

Based on TEM investigations I found that during the service period of the alloy a strong precipitation coarsening along the grain boundaries takes place. The metallography micrographs also support this finding. From these observation I have concluded that during the life-span exhaustion of the investigated steel mainly the grain boundaries are deteriorating. I have stated that the two phenomena, i.e. the deterioration of grain boundaries and the behaviour of the second order, grain-to-grain internal stresses are in strong correlation.